UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/636,021	08/06/2003	David A. Palsulich	108298727US	1017

25096 7590 10/17/2006

PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
DAHIMENE, MAHMOUD	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/636,021	PALSULICH ET AL.
	Examiner	Art Unit
	Mahmoud Dahimene	1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 08 August 2006.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-28 and 49-56 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-28, 49-56 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-9, 11-17, 19-27, 49, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomita et al. (U.S. Patent No. 6,054,373), in view of McNeilly et al. (U.S. Patent No. 5,762,755).

4. As to claim 1, Tomita discloses a method of processing a microfeature workpiece, comprising: supporting a microfeature workpiece (23) by an unheated

support (22) in an interior of a processing chamber (21) (column 7, lines 57-61; Figure 5); contacting a surface of the microfeature workpiece (23) with an etchant liquid (column 7, lines 65-67; column 8, lines 1-2); heating the etchant liquid by delivering radiation from a radiation source (24) through the wall of the processing chamber to heat the etchant liquid (column 4, lines 18-22); controlling the radiation source to maintain a temperature of the etchant liquid at or above a target process temperature to etch the surface of the microfeature workpiece (column 8, lines 3-9). Although Tomita does not expressly disclose the step of removing the etched microfeature workpiece (23) from the processing chamber (21), this step is inherently present in the process.

5. Tomita does not expressly disclose a chamber having a polymeric wall; and the polymeric wall of the processing chamber being substantially non-reactive with the etchant liquid. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2) (column 10, lines 25-30; Figure 1) as a suitable material when both corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a chamber having a polymeric wall, such as a

fluoropolymer. One who is skilled in the art would be motivated to use a polymeric wall, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation. Moreover, because McNeilly teaches that the fluoropolymer is corrosion resistant (column 12, lines 42-44), the characteristic of the polymeric wall of the processing chamber being substantially non-reactive with the etchant liquid would naturally be encompassed.

6. Tomita does not expressly disclose delivering radiation through the polymeric wall; and the polymeric wall being more transmissive of an operative wavelength range of the radiation than the etchant liquid, thereby a temperature of the etchant liquid is increased more rapidly than a temperature of the polyermic wall. However, Tomita discloses heating the etchant liquid by delivering radiation from a radiation source (24) through the wall of the processing chamber to heat the etchant liquid (column 4, lines 18-22). McNeilly teaches or suggests a chamber with a polymeric wall (column 12, lines 42-46). McNeilly further teaches that the polymeric wall, a fluoropolymer, is transparent to infrared radiation (column 12, lines 44-46). Thus, by performing the steps of the combined teachings, delivering radiation through the polymeric wall would naturally be encompassed. Furthermore, the characteristic of the polymeric wall being more transmissive of an operative wavelength range of the radiation than the etchant liquid, thereby a temperature of the etchant liquid is increased more rapidly than a temperature of the polyermic wall, would also be naturally encompassed.

7. As to claim 2, Tomita discloses adding the etchant liquid to the processing space at a first temperature that is below the target process temperature (column 4, lines 59-63).

8. As to claim 3, Tomita discloses that the radiation is delivered substantially uniformly across the surface of the microfeature workpiece (23) (column 7, lines 62-64; column 8, lines 3-9).

9. As to claim 4, Tomita discloses that the radiation comprises infrared radiation (column 7, lines 57-61).

10. As to claim 5, Tomita discloses enclosing the microfeature workpiece (23) within the interior of the processing chamber (21) (column 7, lines 57-61; Figure 5).

11. As to claim 6, Tomita discloses that a temperature of the wall of the processing chamber is no greater than the temperature of the etchant liquid when the etchant liquid is at or above the target process temperature (column 7, lines 62-64, lines 65-67; column 8, lines 1-2). The infrared heater (24) is directed at heating microfeature workpiece (23) (column 7, lines 62-62), rather than the quartz walls of processing chamber (21) (column 7, line 59).

12. As to claim 7, Tomita discloses that processing chamber includes a base (22), a temperature of the base of the processing chamber being no greater than the temperature of the etchant liquid when the etchant liquid is at or above the target process temperature (column 7, lines 62-64, lines 65-67; column 8, lines 1-2). The infrared heater (24) is directed at heating microfeature workpiece (23) (column 7, lines 62-62), rather than the quartz base (22) (column 7, line 60).

13. As to claim 8, Tomita discloses that the radiation is substantially the only heat source for heating the etchant liquid from a first temperature to the target process temperature, which is higher than the first temperature (column 7, lines 62-64). The microfeature workpiece (23) is heated by the infrared heater (24), resulting in the conductive heating of the etchant liquid (column 7, lines 62-64).

14. As to claim 9, Tomita does not expressly disclose an inner surface of the processing chamber comprises a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2) (column 10, lines 25-30; Figure 1) as a suitable material when both corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the inner surface of the processing chamber comprises a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. One who is skilled in the art would be motivated to use a material, such as a

fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation.

15. As to claims 11, Tomita discloses a method of processing a microfeature workpiece comprising: positioning a microfeature workpiece (23) on an unheated support (22) in an interior of a processing chamber (21) (column 7, lines 57-61; Figure 5); enclosing the microfeature workpiece (23) within the interior of the processing chamber (21) (Figure 5); contacting a surface of the microfeature workpiece (23) with an etchant liquid at a first temperature (column 7, lines 62-64); heating the etchant liquid from the first temperature to a second temperature using an infrared heat source (24) positioned entirely outside the enclosed processing chamber (21), the second temperature being higher than the first temperature (column 7, lines 62-64), and the second temperature promoting etching of a surface of the microfeature workpiece (column 5, lines 49-61); and etching the surface of the microfeature workpiece with the etchant liquid at or above the second temperature (column 5, lines 49-61).

16. Tomita does not expressly disclose a processing chamber having a polymeric wall with an inner surface; and the etchant liquid being substantially non-reactive with the inner surface of the processing chamber. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2)

(column 10, lines 25-30; Figure 1) as a suitable material when both corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a polymeric wall with an inner surface. One who is skilled in the art would be motivated to use a material, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation. Moreover, because McNeilly teaches that the fluoropolymer is corrosion resistant (column 12, lines 42-44), the characteristic of the etchant liquid being substantially non-reactive with the inner surface of the processing chamber, would naturally be encompassed.

17. Tomita does not expressly disclose heating the etchant liquid through the polymeric wall; and etchant liquid being more absorptive of radiation from the infrared heat source than the polymeric wall, thereby the etchant liquid is heated more rapidly than the polymeric wall of the processing chamber. However, Tomita discloses heating the etchant liquid by delivering radiation from a radiation source (24) through the wall of the processing chamber to heat the etchant liquid (column 4, lines 18-22). McNeilly teaches or suggests a chamber with a polymeric wall (column 12, lines 42-46). McNeilly further teaches that the polymeric wall, a fluoropolymer, is transparent to infrared radiation (column 12, lines 44-46). Thus, by performing the steps of the combined teachings, heating the etchant liquid through the polymeric wall, would naturally be encompassed. Furthermore, the characteristic of the etchant liquid being

more absorptive of radiation from the infrared heat source than the polymeric wall, thereby the etchant liquid is heated more rapidly than the polymeric wall of the processing chamber, would also be naturally encompassed.

18. Moreover, Tomita discloses that the microfeature workpiece (23) is silicon (column 7, line 62), immersed in phosphoric acid (column 8, lines 25-27), heated to a temperature between 150°C to 300°C (Figure 3). Yokomizo (U.S. Patent No. 6,399,517), cited to support inherency, teaches that exposure of silicon to phosphoric acid at a temperature range of 160°C to 180°C results in silicon etching (column 1, lines 13-24). Therefore, the steps of promoting etching of a surface of the microfeature workpiece at the second temperature; and etching the surface of the microfeature workpiece with the etchant liquid at or above the second temperature are inherently accomplished by Tomita's method.

19. As to claim 12, Tomita discloses that the radiation is delivered substantially uniformly across the surface of the microfeature workpiece (column 7, lines 62-64).

20. As to claim 13, Tomita discloses that the infrared radiation comprises near infrared radiation (column 7, lines 56-58). Tomita's disclosure of infrared radiation is presumed to encompass all wavelengths of the infrared spectrum, including near infrared radiation.

21. As to claim 14, Tomita discloses that a temperature of the wall of the processing chamber is no greater than the temperature of the etchant liquid when the etchant liquid is at or above the target process temperature (column 7, lines 62-64, lines 65-67; column 8, lines 1-2). The infrared heater (24) is directed at heating microfeature

workpiece (23) (column 7, lines 62-62), rather than the quartz walls of processing chamber (21) (column 7, line 59).

22. As to claim 15, Tomita discloses that the processing chamber includes a base (22), a temperature of the base of the processing chamber being no greater than the temperature of the etchant liquid when the etchant liquid is at or above the second temperature (column 7, lines 62-64, lines 65-67; column 8, lines 1-2). The infrared heater (24) is directed at heating microfeature workpiece (23) (column 7, lines 62-62), rather than the quartz base (22) (column 7, line 60).

23. As to claim 16, Tomita discloses that the infrared radiation is substantially the only heat source for heating the etchant liquid from the first temperature to the second temperature (column 7, lines 65-67; column 8, lines 1-2).

24. As to claim 17, Tomita does not expressly disclose that the inner surface of the processing chamber comprises a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2) (column 10, lines 25-30; Figure 1) as a suitable material when both corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-

coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form inner surface of the processing chamber with a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. One who is skilled in the art would be motivated to use a material, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation.

25. As to claim 19, Tomita discloses a method of processing a microfeature workpiece, comprising: supporting a microfeature workpiece (23) with an unheated support (22) in an interior of a processing chamber (23) (column 7, lines 57-61; Figure 5); contacting a surface of the microfeature workpiece (23) with a processing fluid (column 7, lines 65-67; column 8, lines 1-2; Figure 5); delivering infrared radiation through the wall of the processing chamber to heat the processing fluid from a first temperature to a higher second temperature that promotes processing of the surface of the microfeature workpiece (column 7, lines 62-67; column 8, lines 1-2); and maintaining a temperature of the processing fluid at or above the second temperature for a process period to process the surface of the microfeature workpiece (23) (column 8, lines 3-9), a temperature of the wall of the processing chamber being no greater than the temperature of the processing fluid during the process period (column 7, lines 62-64, lines 65-67; column 8, lines 1-2).

26. Tomita does not expressly disclose a processing chamber having a polymeric wall. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing

chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2) (column 10, lines 25-30; Figure 1) as a suitable material when both corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a polymeric wall with an inner surface. One who is skilled in the art would be motivated to use a material, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation.

27. Tomita does not expressly disclose delivering radiation through the polymeric wall; and the polymeric wall being more infrared transparent than the processing fluid, thereby the processing fluid is heated more rapidly than the polymeric wall. However, Tomita discloses heating the etchant liquid by delivering radiation from a radiation source (24) through the wall of the processing chamber to heat the etchant liquid (column 4, lines 18-22). McNeilly teaches or suggests a chamber with a polymeric wall (column 12, lines 42-46). McNeilly further teaches that the polymeric wall, a fluoropolymer, is transparent to infrared radiation (column 12, lines 44-46). Thus, by performing the steps of the combined teachings, delivering radiation through the polymeric wall would naturally be encompassed. Furthermore, the characteristic of the polymeric wall being more infrared transparent than the processing fluid, thereby the

processing fluid is heated more rapidly than the polymeric wall, would also be naturally encompassed.

28. As to claim 20, Tomita does not expressly disclose the processing fluid comprises an etchant liquid and processing the surface of the microfeature workpiece comprises etching the surface of the microfeature workpiece. However, Tomita discloses the microfeature workpiece (23) is silicon (column 7, line 62), immersed in phosphoric acid (column 8, lines 25-27), heated to a temperature between 150°C to 300°C (Figure 3). Yokomizo (U.S. Patent No. 6,399,517), cited to support inherency, teaches that exposure of silicon to phosphoric acid at a temperature range of 160°C to 180°C results in silicon etching (column 1, lines 13-24). Therefore, processing fluid is inherently an etchant liquid and the step of processing the surface of the microfeature workpiece comprises etching the surface of the microfeature workpiece is inherently accomplished by Tomita's method.

29. As to claim 21, Tomita does not expressly disclose that an inner surface of the processing chamber comprises a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. However, Tomita discloses directing an external infrared heater (24) to heat a microfeature workpiece (23) (column 7, lines 62-62), contained in a quartz processing chamber (21) (column 7, line 59; Figure 5). Moreover, the microfeature workpiece (23) is immersed in either sulfuric or phosphoric acid (column 7, lines 65-57; column 8, lines 1-2, lines 25-27). McNeilly teaches the general concept of using a fluoropolymer material in a vapor etching chamber (2) (column 10, lines 25-30; Figure 1) as a suitable material when both

corrosion resistance (column 12, lines 42-44) and transparency to infrared wavelengths are required (column 12, lines 44-46). McNeilly also teaches the use of fluoropolymer-coated quartz in etching chambers (column 13, lines 6-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the inner surface of the processing chamber comprising a fluoropolymer, further comprising contacting the inner surface of the processing chamber with the etchant liquid. One who is skilled in the art would be motivated to use a material, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation.

30. As to claim 22, Tomita discloses adding the processing fluid to the processing space at an introduction temperature that is below the second temperature (column 4, lines 59-63).

31. As to claim 23, Tomita discloses adding the processing fluid to the processing space at the first temperature that is below the second temperature (column 4, lines 59-63).

32. As to claim 24, Tomita discloses that the radiation is delivered substantially uniformly across the surface of the microfeature workpiece (23) (column 7, lines 62-64; column 8, lines 3-9).

33. As to claim 25, Tomita discloses that the radiation comprises infrared radiation (column 7, lines 57-61).

34. As to claim 26, Tomita discloses enclosing the microfeature workpiece (23) within the interior of the processing chamber (21) (column 7, lines 57-61; Figure 5).

35. As to claim 27, Tomita discloses that the radiation is substantially the only heat source for heating the processing fluid from the first temperature to the second temperature (column 7, lines 62-64).

36. As to claims 49-56, Tomita discloses "According to a first aspect of the present invention, there is provided a method of supplying a chemical agent to the surface of a semiconductor substrate and simultaneously heating the semiconductor substrate to release and rediffuse metallic impurities in the semiconductor substrate to allow them to move to the surface of the semiconductor substrate, thereby dissolving them with the chemical agent to remove them" (column 1, line 63). Clearly Tomita teaches heating the substrate/chemical-agent faster than the container walls since the container walls are transparent to the radiation otherwise the radiation would not heat the substrate, which reads on applicant's limitation of "increasing a temperature of the etchant liquid more rapidly than a temperature of the polymeric wall by delivering radiation to the etchant liquid from a radiation source and through the polymeric wall of the processing chamber" Tomita heats both substrate and chemical agent with radiation heating, if the chemical agent absorbs the radiation more than the substrate the chemical agent will heat faster than the substrate and certainly more that the container walls since the container walls are transparent to the radiation meaning they do not absorb radiation and therefor cannot be heated directly by the radiation.

Claim Rejections - 35 USC § 103

37. Claims 10, 18, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomita in view of Yokomizo et al. (U.S. Patent No. 6,399,517).

38. As to claims 10, 18, and 28, Tomita does not expressly disclose etching the surface of the microfeature workpiece yields a resultant etchant, the method further comprising determining at least one chemical property of the microfeature workpiece by chemically analyzing the resultant etchant. However, Tomita discloses that the silicon microfeature workpiece (23) is silicon (column 7, line 62) and immersed in phosphoric acid (column 8, lines 25-27). Yokomizo teaches that when etching silicon with a phosphate etchant, the concentration of silicon in the phosphate increases, and that the solution must be periodically changed (column 1, lines 34-40). Yokomizo discloses a processing chamber (10) for etching microfeature workpiece (W) in etchant liquid (E), which contains a concentration sensor (50) (column 4, lines 54-59) to detect silicon concentration in the etchant liquid (column 7, lines 15-22). Moreover, when the silicon concentration reaches a predetermined level, this signal can either terminate the etching process (column 7, lines 15-22) or trigger replacement of the etchant liquid (column 7, lines 43-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the step of determining at least one chemical property of the microfeature workpiece by chemically analyzing the resultant etchant. One who is skilled the art would be motivated to determine the completion of the etching process or to determine when the etchant liquid should be replenished.

Response to Arguments

1. Applicant's arguments filed on 08/08/2006 have been fully considered but they are not persuasive.

39. Regarding claims 1-9, 11-17 and 19-27, applicant states "Tomita and McNeilly do not support a prima facie case of obviousness over claim 1 because (1) there is no suggestion or motivation to modify the references or to combine reference teachings, and (2) there is not a reasonable expectation of success for such a modification". Motivation to modify the references or to combine reference teachings has been provided, the office action cited "One who is skilled in the art would be motivated to use a polymeric wall, such as a fluoropolymer, which is both resistant to etching chemicals and transparent to infrared radiation. Moreover, because McNeilly teaches that the fluoropolymer is corrosion resistant (column 12, lines 42-44), the characteristic of the polymeric wall of the processing chamber being substantially non-reactive with the etchant liquid would naturally be encompassed."

As to applicant's argument about the temperature of the beaker, applicant assumes the temperature of the liquid/gas equals that of the beaker, this might be true in the case of conductive heating, however, in this case radiation heating is used, the beaker walls could possibly be cooled from the outside of the beaker with a cooled air flow which might be considered as a reasonable engineering practice, or the heating action is provided in a pulse short enough to allow heating of the substrate/etchant interface without heating the container walls since the container walls are transparent to

the heating radiation. One of ordinary skill in the art would have been motivated to solve temperature problems prior to use, or in the particular case, adjust the operating temperature to an acceptable range since the workable temperature range also includes a safe temperature range.

40. As to the argument stating that McNeilly does not teach or suggest that the processing chamber can have polymeric walls, McNeilly teaches or suggests a chamber with a polymeric wall (column 12, lines 42-46). McNeilly further teaches that the polymeric wall, a fluoropolymer, is transparent to infrared radiation (column 12, lines 44-46). Thus, by performing the steps of the combined teachings, delivering radiation through the polymeric wall would naturally be encompassed. Furthermore, the characteristic of the polymeric wall being more transmissive of an operative wavelength range of the radiation than the etchant liquid, thereby a temperature of the etchant liquid is increased more rapidly than a temperature of the polyermic wall, would also be naturally encompassed.

41. As to applicant's argument citing that there is no reasonable expectation of success because liquid versus vapor etchants might have different corrosion characteristics, applicant has not shown a specific case where such an assertion is supported.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Dahimene whose telephone number is (571) 272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MD.

NADINE NORTON
SUPERVISORY PATENT EXAMINER
ART UNIT 1765